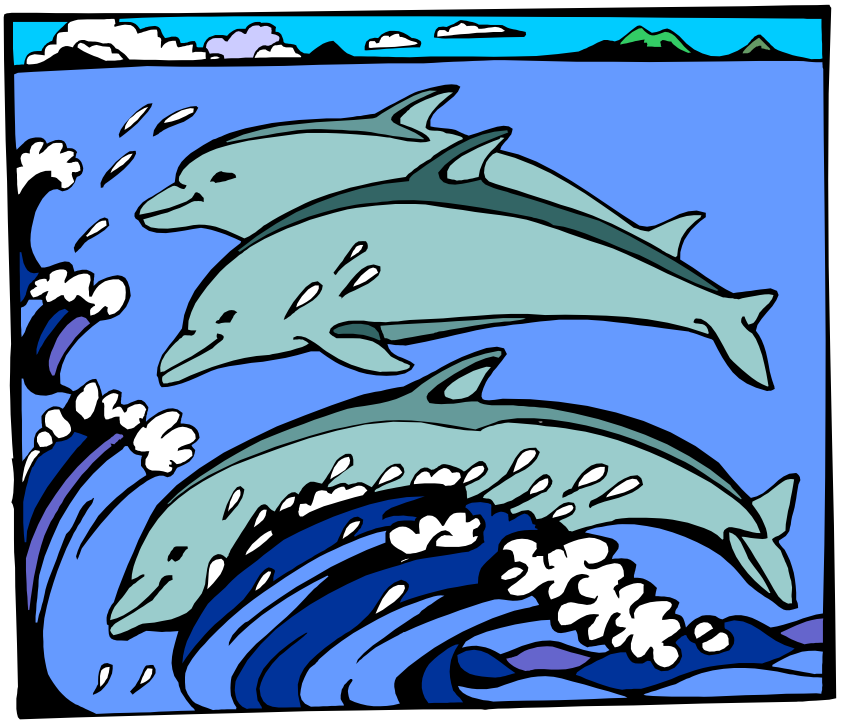
OBSERVER MANUAL



FOR 2004 MARINE MAMMAL CRUISES
IN THE GULF OF MEXICO AND ATLANTIC OCEAN
ABOARD NOAA SHIP *GORDON GUNTER*

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I. Introduction

A. Cruise Objectives

1. Conduct visual line-transect surveys for abundance estimation and distribution of cetaceans in the Gulf of Mexico/Atlantic Ocean.
2. Conduct acoustic line-transect surveys for abundance estimation and distribution of cetaceans in the Gulf of Mexico/Atlantic Ocean.
3. Conduct photo-identification of individual cetaceans, including sperm whales.
4. Collection of tissue samples (biopsies) of select cetaceans using a variety of devices including rifles and crossbows.
5. Collection of sloughed skin and fecal samples of select cetaceans.
6. Collect data on distribution and abundance of sea turtles, sea birds, and other marine life.
7. Collect data on distribution and type of marine debris encountered during the survey.

B. Itinerary

Dates	Location
April to June, 2004	Gulf of Mexico
June to August, 2004	Atlantic Ocean

C. Cruise Participants

To be determined.

II. Welcome Aboard

A. Chain of Command

Each leg of the survey is assigned a field party chief (FPC). The FPC has overall responsibility for the research effort aboard the ship and for coordinating the scientific mission with vessel personnel. The FPC reports back to the SEFSC labs to keep them updated on cruise progress. Members of the scientific party report directly to the FPC. The FPC represents the scientific party in dealing with the ship's staff, and has authority to act on behalf of the SEFSC. All operational or sensitive communications from the scientific party to the ship's staff should pass through the FPC. The FPC will initiate any change in operating procedure or handle any out of the ordinary matter. If you have a problem, contact the FPC.

B. Shipboard Policies and Safety Information

A detailed briefing on ship policies and safety procedures will take place onboard the ship, and a manual will be in your stateroom. Here are a few highlights.

Possession or use of alcohol, illegal drugs, or prescription medication without a prescription is strictly forbidden and will not be tolerated. Personally owned firearms are not permitted aboard the ship. Sexual harassment will not be tolerated. Smoking is prohibited in all interior spaces, near air intakes, and near flammable materials. Smoking is permitted on weather decks, provided that smoke does not enter the ship through ventilators, hatches, or other means.

If you assist with work on deck, such as deploying equipment over the side, you may be required to wear a safety vest and hard hat. You may also be required to wear a safety belt or line.

Emergency safety drills will be conducted while at sea. All hands should read and understand emergency procedures. Drills are established for fire and collision, abandon ship, and man overboard situations. Each stateroom is equipped with a life jacket and survival suit for each occupant. For abandon ship drills, all hands are required to wear their life jackets and carry their survival suits when reporting to their life raft muster stations. All persons shall bring along or wear clothing that covers their arms and legs, as well as a hat, socks, and shoes. The signals indicating an emergency are as follows:

> Fire and emergency - continuous ringing of the general alarm bell for 10 sec. and continuous sounding of the ship's whistle for 10 sec.
>
> Abandon ship - seven or more short blasts on the ship's whistle and general alarm bell, followed by one prolonged blast
>
> Man overboard - three prolonged blasts on the ship's whistle and general alarm bell
>
> Dismissal from drill - three short blasts on the ship's whistle and general alarm bell

C. Interpersonal Relations

While living and working aboard NOAA ships, all scientific personnel should keep in mind that the officers and crew spend a greater portion of the year on the ship than they do on shore. Procedures and expectations of ship personnel have become established through many projects throughout the years. Respect this when dealing with ship personnel. Always ask before using any ship equipment. Maintain a professional demeanor and frame clear and concise requests during radio communications and during interactions with officers and crew.

People working and living together on a ship creates an unusual social/work environment. There is minimal privacy and space, and individuals will be spending an extended amount of time together in an isolated setting. In this environment otherwise minor incidents can gain great importance, so please try to keep things in perspective. Occasionally conflicts arise. If you have difficulty working with someone, feel threatened, or feel discriminated against, please contact the FPC. The FPC needs to know about the problem as soon as it arises so he/she can help resolve the issue and prevent the problem from becoming worse.

D. Dress Code and Footwear

Dress at sea is very casual and appropriate to the work and weather. It can be extremely hot during summer, so bring lightweight clothes. It can also be quite cool inside the ship, so bring warm clothing as well. Long pants, a long-sleeved shirt, and a hat are required for abandon ship drills. Be sure to pack clothing that you do not mind getting dirty or wet. A few rules of dress are enforced at meal times in the ship's galley. Please remove hats or other headgear and refrain from wearing tank tops during mealtimes. Hats and tank tops are appropriate (and recommended) during work outside, but not in the galley during meals.

Closed-toed shoes are mandatory throughout the ship. The exception is your stateroom. Do bring flip-flops for the shower or your room, but once you leave your stateroom, you must wear closed-toed shoes.

E. Staterooms

Each person is responsible for the cleanliness and maintenance of his/her stateroom and the secure stowage of personal belongings.

The vessel crew and scientific party will be working 24 hours a day, so sleep will be an important activity for someone at all hours of the day. Noise levels should be maintained with respect for people that are off watch and trying to sleep. Please be considerate, especially with closing doors, talking in the hallways, TV volume in your stateroom and in the lounge, and music volume in the exercise room.

F. Meals

There is sufficient seating in the galley to accommodate only half the complement at a time. Therefore, the oncoming watch will be seated in the first half hour of meal time, and the relieved watch will be seated during the second half hour of meal time. If your watch does not change during the meal hour, you may eat anytime, but seating preference should be given to oncoming watch standers. As a courtesy to the stewards, please avoid showing up for meals during the last 15 minutes of the scheduled period unless unavoidable. After you have finished eating, please leave the galley to make room for others. Do not linger in the galley after meal times, as the stewards need to clean up and prepare for the next meal. Meal hours are as follows:

Breakfast 0630 - 0800 Lunch 1130 - 1230 Dinner 1630 - 1730

G. Laundry

The ship has a laundry room with washers, dryers, and a supply of detergent. The washers and dryers receive heavy use in a hostile environment, so please do not abuse the equipment and be sure to follow all posted instructions. Please remove your clothes promptly so the next person can use the machine. Please wash only full loads to conserve water.

Clean linens (flat sheet, fitted sheet, and pillowcase), blankets, and a towel and washcloth will be provided upon arrival.

H. Exercise room

The exercise room onboard the Gunter is well equipped with a treadmill, stair-stepper, exercise bike, rowing machine, free weights, universal gym, sit-up bench, and mats. A CD/tape player is available, but remember to keep the volume at a reasonable level. Please make sure to wipe down equipment after use.

I. Communication with Those Ashore

Email
The ship generally has email service available for use by the scientific party, and the ship will pay for satellite time for reasonable usage. However, do not send large files or graphics, and ask your correspondents not to send them to you. The ship's electronic technician will give you an email address after arrival.

Phone
In the event of an emergency, please have people contact the Ship's office (Port Captain) at 228-769-0307 or the Pascagoula laboratory at 228-762-4591 (x263 Velda Harris) during business hours. Outside of business hours, the ship can be reached directly by calling the following numbers (please try in order as expense increases in that order):
Cell phone: 504-731-5070
Wave talk: 877-815-3467
Inmarsat: 011-874-330-391-310

Scientific members may be allowed short (5 minute), occasional personal calls under certain conditions, including the scientist using a calling card or credit card. Depending on the study area, occasionally the ship comes within cell phone range, so if you own a personal cell phone, bring it with you.

III. Visuals

A. Visual Personnel

Observers and survey specialists are responsible for collecting the primary data for which the cruises are designed. Survey specialists are experienced observers who have demonstrated ability to organize the collection of scientific data and identify the marine mammal species of the study area. Generally these individuals have watches which are spaced so that one or more will always be on duty. In the past we have referred to these persons as "team leaders," and often they will act as leaders based on their experience with previous surveys. These persons will aid in maintaining the consistency of effort between this and previous surveys. However, all team members are encouraged to contribute to decision making and to ask questions However, the survey specialist may make final decisions on certain situations (e.g., when to divert the ship, whether a sighting is on- or off-effort). If confusing or unique situations arise, decisions should be made in conjunction with the FPC.

Observer teams will use 25 x 150 "big eye" binoculars, hand-held binoculars, and unaided eye to scan the waters over the forward 180° along the vessel's course. Observers will work together to identify as many of the identifiable groups in the search path as possible. Identifying the species and estimating group size are your first responsibilities after a sighting is made. All observers on watch should participate regardless of experience level. All observers should remain on the flying bridge unless it is necessary to go to the bow for species identification. Only after the species is identified and the group size estimated should your watch consider going to the bow or taking photographs.

B. Rotations

Observers alternate shifts throughout daylight hours. In general, observers work for two hours and then have two hours off. Exceptions include meal times rotations and some sperm whale sightings or other special projects when extra personnel are needed. During a given watch, observers will rotate through three different positions: left binoculars, data recorder, and right binoculars. Observers will switch positions every 40 minutes. Observers also rotate on a daily schedule, meaning a different set of people will begin effort at sunrise each day. Watch rotations will be posted outside the FPC's door and on the dry lab door. You should be on the flying bridge available to work five minutes before your watch begins.

C. While on Watch

While on watch, observers will rotate through left binocular, data recorder, and right binocular positions. It is extremely important to maintain consistency in searching effort. While on effort, all three members of the observer team are actively searching for marine mammals. Any other configuration should be recorded as "off effort."

While at the binocular positions, each observer scans out to the horizon from abeam (90°) on his/her side of the ship to 10° to the opposite side of the bow. In total, the observers scan 100°, with overlap on the trackline. The binocular stands are equipped with a 360° azimuth ring, enabling the observer to read relative bearing. Angles should not be rounded, but read to the nearest degree. A reticle scale inscribed in the eye piece is used to measure distance.

The recorder is responsible for searching the area near the ship and along the trackline using naked eye and hand-held binoculars. The area near the ship cannot be searched by the big-eye binoculars, so it is the recorder's job to maintain a search of this area so sightings near the ship are not missed. It is also the recorder's job to record all data on the laptop computer, including searching, sighting, and environmental data. Each new recorder updates the observer rotation and environmental data immediately upon rotating. Recorders should call out the environmental conditions to the team so that everyone is in agreement and knows what has been entered. In addition, the recorder is generally the person who communicates with the bridge via hand-held radio.

A CD player will be provided so that observers can listen to music while on watch. Observers should bring CDs, and everyone will have a chance to select CDs to play during his/her watch. Once a CD is started, generally let it play. The recorder is not a disc-jockey and should spend a minimum amount of time changing CDs. If anyone for any reason finds the music disruptive, offensive, etc., that CD should be stopped with no questions asked. The volume should be kept at a level comfortable for all observers and not so loud that observers cannot communicate cue or other information effectively. If any observer feels the music is too loud, the recorder should adjust the volume. When a sighting is made and during a sighting, the music should be turned OFF. Listening to music while on watch is a privilege that makes watch more enjoyable, especially during "slow" times. Exercise good judgment and do not let music interfere with work or communication. When in doubt, just turn the music off.

People who are not on-watch should not engage in lengthy conversation with on-watch observers. It is okay to come up and ask a simple question.

D. Flying Bridge Step by Step Procedures

Listed are step by step procedures to follow while on the flying bridge:

1. As soon as observers rotate, it is the data recorder's job to enter the observer rotation. At that time, the recorder should update the environmental conditions as well. Please call out the environmental conditions to your team so that everyone is in agreement and knows what has been entered.

2. When you see a marine mammal or what may be a marine mammal, let your team know you need a cue entered. You can say, "I have a cue!" Be sure to speak loudly enough that your team can hear you. Announce the bearing and reticle of the cue (e.g., 10 degrees right, 3 reticles). At this time, the data recorder enters the cue. If it is the data recorder that sees a marine mammal, the recorder may ask one of the team members to enter the cue if he/she needs to keep his/her eyes on the area, or if the team can quickly pick up the sighting, the recorder can go ahead and enter the cue.

3. Radio the acoustics team with cue information and let them know if you go off effort.

4. Make the decision to stay on effort or go off effort, and decide whether the ship needs diverted. If the team has stopped scanning and is focusing on one area, then the recorder needs to take the team off effort. If you are sure the cue is a marine mammal, then the team needs to identify and count the group. In most cases the ship needs to be diverted to identify and count the group properly. In some instances, the group may be too far away from the trackline to divert (see chart on data computer). When you make the decision to divert the ship, radio the bridge and ask for the course change. Again, the recorder needs to make sure the computer says off effort by this point.

5. Approach the group to identify the species and estimate group size. Group size will be estimated individually, so do not discuss your estimates with your team. You can point out animals and subgroups you think the others may have missed. Identifying the species and estimating group size may require additional course changes as the group changes direction, etc. If the biopsy team wants to attempt biopsies, help direct the ship to facilitate this. Keep sight of dolphins as they "fall off" the bow, and be ready to tell the biopsy team where the dolphins are located.

6. When you have made the identification and estimated group size, and when you are finished assisting the biopsy team if need be, radio the bridge and ask them to return to the trackline (original course) if a diversion was made.

7. The recorder needs to enter the sighting information. This may require asking the bridge for the depth in fathoms and SST in decimal °C. The recorder also needs to radio acoustics with the species identification. While the recorder enters the sighting and contacts acoustics, whoever first sighted the group needs to begin filling out the sighting sheet. Ask your team members for information you're not sure about and discuss what everyone saw. All observers should enter their best, high, and low group size estimates into their notebooks.

8. When the sighting information has been entered into the computer, acoustics has been contacted with a species ID, observers have filled out their notebooks and started a sighting

sheet, and the ship has returned to the trackline, the team is ready to go back on effort. The bridge will inform you when the ship is back on course, so as soon as the team is ready, the recorder should put the team back on effort and let acoustics know the visual team is back on effort.

E. Additional Data Collection and Flying Bridge Procedures

Identifications
Taxonomic identifications should be conservative. Observers should come to agreement about which species or taxonomic groups were present. When there is doubt or disagreement, the survey specialist will make the final determination of the appropriate taxonomic level to record for the sighting. When identification to species level cannot be made, observers should indicate probable or possible identifications on the sighting sheet.

Sighting sheets
Sighting sheets should be completed and turned in as soon after watch as possible, and no later than nightly. It is the responsibility of the observer who made the sighting to fill out a sighting sheet for that group. If you need assistance from other observers who got a better look or saw behavior you did not see, please have that observer add information to the sighting sheet. Sighting sheets should include characteristics actually seen, not those listed in a guide book. Please fill out sighting sheets as soon after your watch ends as possible so you will remember the details more clearly.

Group size estimates
Group size is estimated by each observer on watch and should not be discussed among team members. Observers make three estimates (best, high, low) for each sighting. A high estimate is the number that the observer feels confident is not exceeded by the number of animals in the group. Likewise, a low estimate is the number for which the observer is confident that the group size equals or exceeds. These three numbers are recorded in each observer's notebook during watch, and then entered into a computer in the lab after each observer gets off watch. It is important that observers maintain as consistent a method as possible of estimating group size throughout the duration of the survey independent of other observers.

Any observer who sees a group is responsible for making estimates of the group size. If an observer does not see a particular group, the observer should enter "no estimate" in his/her notebook for that group. This will most likely occur when sightings are made through the left or right binoculars and the recorder does not have a chance to observe the group. Depending on how long the group is at the surface, the other binocular observer may not have the opportunity to observe the group either. In the computer file only the observer codes of "estimating observers" will be entered. Observers should enter their best estimates based on what they saw.

Sightings made by individuals other than the on-watch observers
Every attempt is made during surveys to keep the search effort as uniform as possible. Therefore, all personnel not working as an on-watch observer must follow the 90° rule: cetaceans should not be pointed out to the on-watch observers until the cetaceans have passed more than 90° to either side of the vessel (they have passed abeam of the ship). There are no exceptions to this rule. Once the animals have passed abeam of the ship, they can be recorded. These sightings are on-effort sightings. The sighting observer should be recorded as "other" in

the database. This will alert the data analyst that the animals were missed-by the primary team and should be treated differently in the analysis.

Sightings made when the primary team is in an off-effort mode
Any new sighting made while observers are off effort should be entered as an off-effort sighting. This often happens when observers have made a sighting and have diverted the ship to approach a group. If a second group is seen while off effort, record this group as an off-effort sighting. Sometimes sightings are made when the ship has stopped for an environmental station. These should also be recorded as off-effort sightings.

In some cases, off-effort sightings of common species will not be recorded. Examples are before and after the survey day (i.e., when the computer is off). The FPC or survey specialist will make this decision.

Considerations for stopping or altering effort
When sea conditions reach Beaufort 6, conditions become too poor for marine mammal survey effort to continue. Termination of effort should be determined by the team in conjunction with the FPC. The FPC will decide whether to maintain some type of naked eye watch during the time normal effort has ceased.

The survey specialist, in consultation with the bridge and possibly FPC, may decide to alter the ship's course for short periods of time to avoid or attempt to avoid rain squalls. This decision will be made on a case by case basis. The ship may be able to make a small diversion and avoid a rain cell, or it may be more efficient to go through a band of rain and go off effort temporarily. In the event of rain other than a light sprinkle, effort will probably have to be terminated temporarily. Be sure to cover the computer area, put the lids on the big eye lenses, and stow the binoculars before leaving the flying bridge. Observers may seek temporary shelter on the bridge to ask about the rain. However if it does not look like the rain will stop quickly, have one observer wait on the bridge for the rain to pass, and then alert the team when effort can resume. Alternatively, if you are in the way, you can make arrangements for the bridge to contact you in a certain area when it has stopped raining. Be sensitive to the situation on the bridge before having the whole team or a member "hang out" there.

In the event of severe trackline glare or stack fumes blowing in the direction of the flying bridge, the observers may ask the bridge to turn the vessel 10-15° to attempt to alleviate the problem. The vessel should return to base course once the glare or fumes are no longer a problem. If a mild turn does not alleviate the problem, radio the FPC for assistance.

If at any time you are not sure what to do or have a problem, contact the FPC.

Radio communication
Speak clearly when using the radio and hold the radio approximately 2 inches away from your mouth. Hold the PTT (push to talk) button down for ~0.5 seconds before speaking. Your transmission should begin with the station you are calling followed by the calling station (you) and the message. For example, "Acoustics, flying bridge. We have a cue at 40 left and 3.5 reticles." Examples of appropriate responses: "Flying bridge, acoustics copies," "Acoustics copies," or "Roger that flying bridge." When there is a lot of radio traffic be mindful and only break into the conversation when others are not talking or expecting an immediate response. Be

sure to take a radio should the entire watch leave the flying bridge. In general, the working science channel is VHF 82A.

Maintenance of equipment
Visual observers are responsible for maintenance and care of equipment on the flying bridge. On a daily basis, take care of the big-eye and hand-held binoculars by making sure they are covered correctly and stowed at the end of each day or in the event of inclement weather. Also, each day help store gear, remove garbage, and tidy up for the next day. As needed, please grease big eye mounts, wipe big eye lenses with lens cloth, rinse big eyes with fresh water, and remove extra personal items from the flying bridge.

Other duties
You may be requested to assist with the deployment of environmental sampling gear, such as the CTD or XBTs, or assist with retrieval of the acoustic array.

F. Sperm Whale Sightings

Relatively accurate and unbiased group size (GS) estimates are required to calculate abundance of sperm whales. Unfortunately, sperm whales spend most of their time underwater making their detection and enumeration a difficult task. Added to this is the fact that while many cetacean species surface and dive in rough unison, sperm whales can at times, surface and dive asynchronously. Combine this with the tendency of groups to spread out over areas that are measured in square miles at times, and the likelihood of sperm whale abundance estimates being accurate may be reduced unacceptably if methods specific to sperm whales are not employed during surveys.

On past SEFSC surveys, group sizes of sperm whales were based on what the observer(s) recorded after short periods of time, usually less than 5 to 10 minutes. Owing to the ease with which sperm whales could be positively identified at long distance, many times the ship would not even divert to an area where one or two sperm whales were spotted. The sighting was entered with the number of whales seen during this relatively brief period. Given the behavioral factors noted above, it is very likely that group sizes were negatively biased in the past. This would, of course, lead to negatively biased abundance estimates.

What can we do?
Accurate estimation of sperm whale group sizes requires procedures that are quite different from those employed for other species of marine mammals. Both passive acoustics and species specific visual procedures will help tighten the precision of sperm whale GS estimates.

Some terms
Instantaneous count: An estimate of group size recorded by the observers at a time not to exceed five minutes from the initial sighting. This time is a subset of the ten-minute count. The desired effect here is to closely mimic past SEFSC group size estimates.

Ten-minute count: An estimate of group size is recorded by the three observers present on the flying bridge at the time of the initial sighting. If a sighting is made just before a rotation period, the three observers present at the time of the sighting are responsible for remaining on the flying bridge and completing the ten-minute count. This number would give an idea of a 'best estimate' as if we were operating in passing mode.

Ninety-minute count: This count will be made after ninety minutes. In total, one hundred minutes will have passed since the initial sighting. This count will involve all available personnel. We would like to have a minimum of five people observing and one data recorder for this period. At the end of the ninety minutes, all personnel will register an independent estimate of the group size. All estimates consist of a high, a low and a best count. No small boat will interact with the group until after the ninety minute count is terminated.

Diving behavior: Sperm whale behavior, as it relates to this experiment, can usually be categorized in one of three varieties. *a)* Surface active groups are generally tightly associated and may be resting or socializing. This behavior seems most prevalent during late afternoon or early evening hours. While some members of the group may submerge for long periods of time, they usually do not fluke up to make these dives. It is usually possible to count most of the group simultaneously during this behavior. Special attention should be paid to whales that momentarily show the tip of their head and then sink slowly. A behavior sometimes described as 'sleeping' has the animals hanging vertically in the water for extended periods. This behavior may involve a number of whales in close proximity. *b)* Synchronously diving groups may be spread over much larger areas and dive for extended periods of time. Upon diving, they usually show their flukes. *c)* Most of the time, groups will be seen exhibiting asynchronous diving behavior. This also involves deep/extended diving indicated by lifting the flukes almost vertically (fluking up) at the beginning of the dive. These groups will likely be spread over a large area and will likely be in chorus-line configuration. Group speed will be about two to four knots. During asynchronous and synchronous diving, surface intervals will be roughly eight to twelve minutes.

Clusters: Clusters are the sub-groups that comprise the group. A cluster may contain one to many whales.

Visual procedures

In many instances, sperm whales dive for periods of time that can exceed forty-five minutes. Assuming that no sperm whale will dive for more than seventy-five minutes, a period of ninety minutes should provide adequate opportunity for all whales present in an area to have made themselves available for detection and enumeration.

When a sperm whale is sighted start the sighting clock and contact the FPC. The survey specialist in conjunction with the FPC will decide when to go off effort and how to approach the group. During this time (before ten minutes have passed) secure the help of all available observers (have the bridge make a page) needed for a ninety-minute count. The Sperm Count program will be started as soon as possible during this time. It is ideal to establish group direction and group center as soon as possible. This will likely not be apparent until the ninety-minute count is underway. Experience will help in deciding what the proper course and speed will be for the ship to follow along. Ideally, you would want to follow along about a half mile to one mile behind the center of the group at an equal speed.

Once the ninety-minute count begins, the observers are to spread out so that whales surfacing anywhere around the ship will be sighted. Handheld binoculars should be utilized in addition to the naked eye by all observers not located at the big-eye stations. All cluster sightings and dives will be reported to the recorder for entry into the Sperm Count program.

Acoustic procedures

Until the acoustic team is alerted, their job remains to locate as many whales as possible and start to get an idea of the number of whales in the area. The time before the ship slows will be the best time for the acoustics team to understand the group dynamics since the vessel is still making good speed. Once the ship is slowed and goes into visual follow mode, acoustics primary role will be to maintain contact with the overall group especially if animals fall behind the beam where it becomes more difficult for the visual team to track them.

IV. Acoustics

A. Rotations

During the cruise the passive acoustics system will be monitored 24 hours per day. Operators will rotate 3 or 4-hour shifts to monitor the acoustics suite. Either an acoustics team leader or the FPC will be available to provide relief for meals and breaks during the daylight hours. One of those persons will also be available during night watches for assistance if needed.

B. While on Watch

The operator will be responsible for recording the audio signals made by marine mammals encountered during his/her watch. In addition to the audio signal, the operator will also record or assure that all metadata relating to the survey and acoustics are recorded in a manner which will readily allow an analysis to be performed post-cruise. The operator is also responsible for deploying and retrieving the array as needed. Detailed instructions will be provided in a separate handout. During normal survey operations, the acoustics team will not inform the visual team of contacts unless instructed to do so. While on survey, the acoustic team is not to relate information regarding acoustic contacts in a manner that will provide any assistance to the visual team without instruction from the FPC. However, the visual team will inform acoustics of any visual cues as soon as possible.

C. Data Collection

The most important consideration with regard to acoustic data collection is to assure that the timing of events are correctly noted and preserved. This will assure that a comparison of visual and acoustic data will be possible after the cruise. Anytime that equipment deployment or settings change, notes should be made describing the changes. Data collection will be discussed further in an additional acoustics handout.

V. Biopsy Sampling

As time and circumstance permit, biopsy samples will be taken from species of interest for genetic studies on stock and population structure. Hollow-tipped darts fired from a rifle or crossbow will be used to collect samples. Biopsy attempts will be made from the bow of the ship or from a small boat deployed from the ship. The FPC will designate biopsy samplers, but other observers will have the opportunity to assist by recording data, taking video, and processing samples. Biopsy samples will be processed immediately or stored in the freezer until such time they can be processed.

VI. Photo-identification Studies

For particular species of interest, such as the sperm whale and killer whale, fluke or dorsal fin photographs will be taken for identification purposes. These photographs will be added to existing catalogues and used for studies on abundance and ranging patterns. The FPC will designate photographers for this purpose. Photographs will be taken from the ship or from a small boat deployed from the ship, often in conjunction with biopsy efforts.

VII. Small Boat Operations

As time permits, the deployment of a small boat from the ship may be necessary to conduct biopsy or photo-identification operations. The FPC will assign designated biopsy samplers, photographers, and/or boat drivers to the small boat. These persons should plan on being out for 4-6 hrs at a time, and should prepare accordingly with sunscreen, water, snacks, raingear, etc. Persons remaining on the ship who would normally be off watch will be required to fill in for absent observers and assist in flying bridge operations.

VIII. Oceanography

Throughout the cruise oceanographic data will be collected. Data will be collected continuously on sea surface temperate, salinity, and fluorescence of surface water. In addition, expendable bathythermographs (XBTs) will be dropped several times throughout the day while the ship is underway. The ship will be stopped one to two times per day to conduct conductivity-temperature-depth (CTD) casts. An Acoustic Doppler Current Profiler (ADCP) will also be employed. A dedicated oceanographic technician may be present during each leg; however, this technician will require the assistance of visual or acoustic personnel to assist with deployment of equipment.